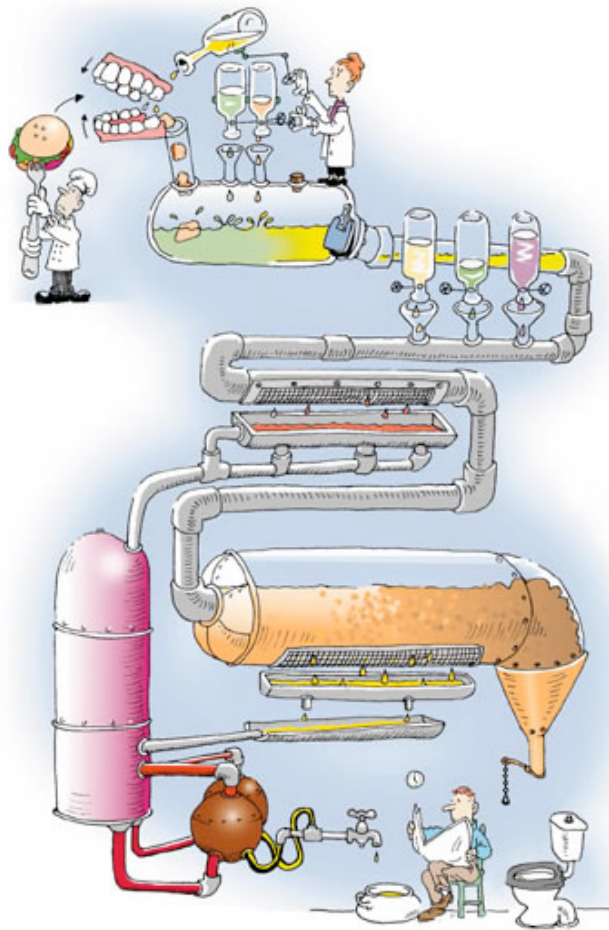
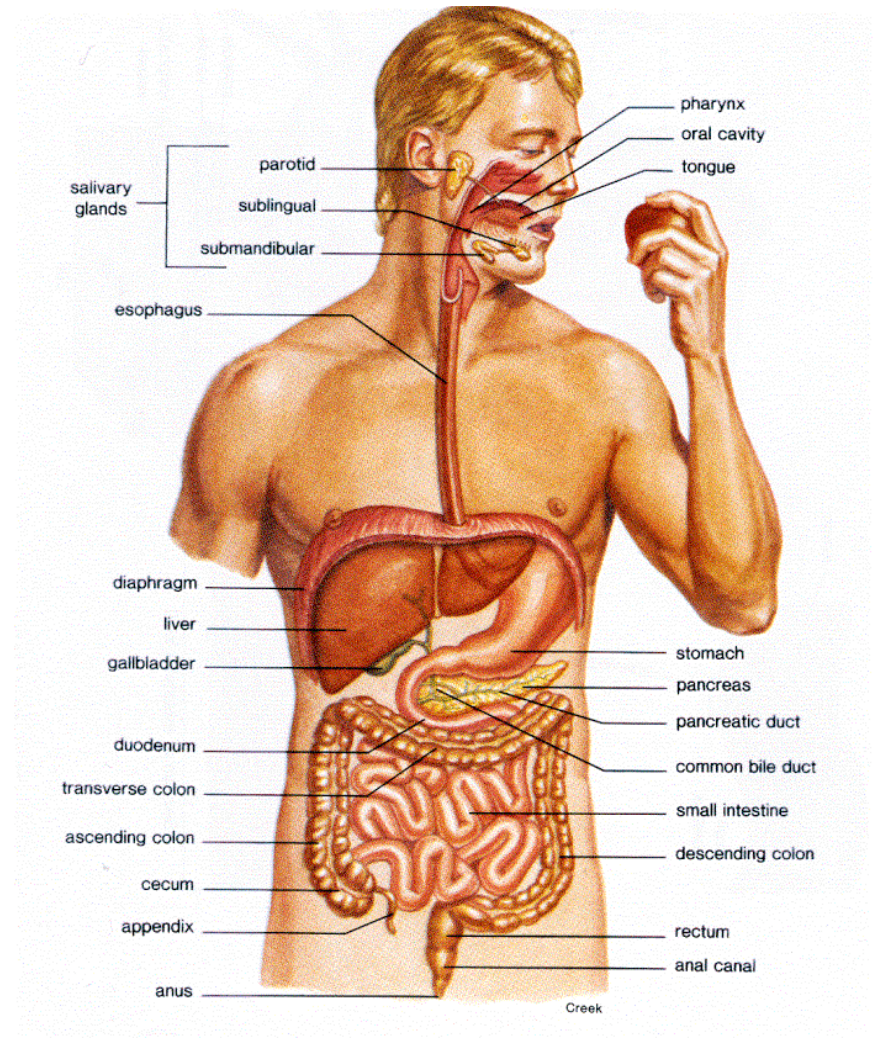


The Digestive System



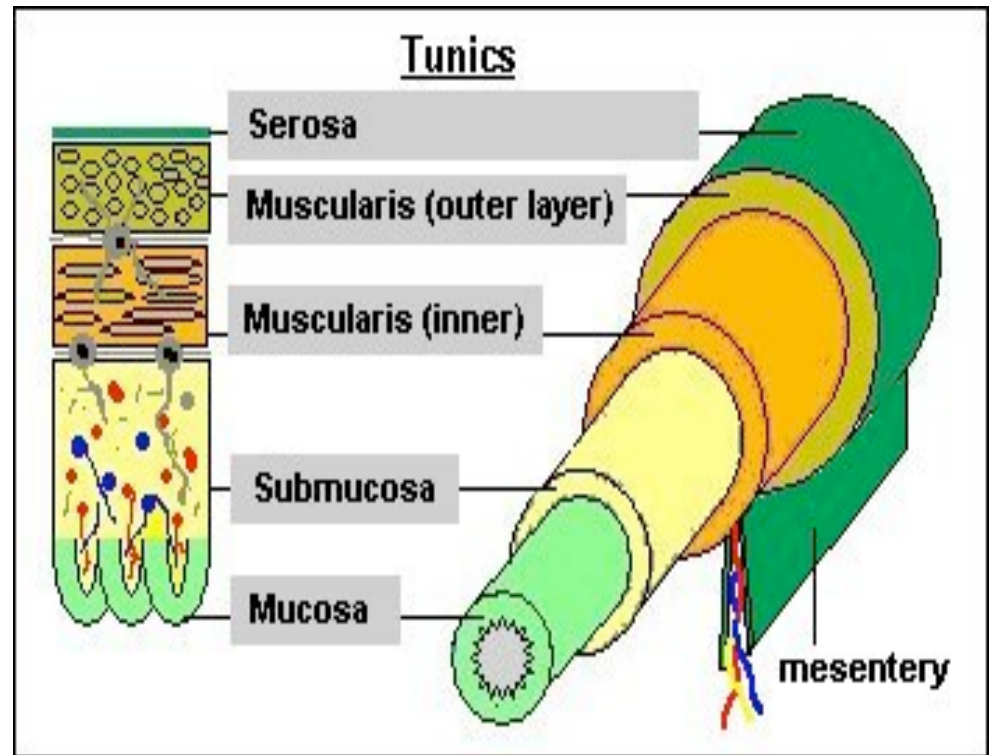
Introduction

- Function: mechanical & chemical breakdown of food, so products can be utilized
- Components: alimentary canal – mouth – anus



Layers of the alimentary canal

- Mucosa – innermost layer, secretes mucous, absorbs & protects
- Sub- mucosa – plexus (network of blood vessels & nerves)

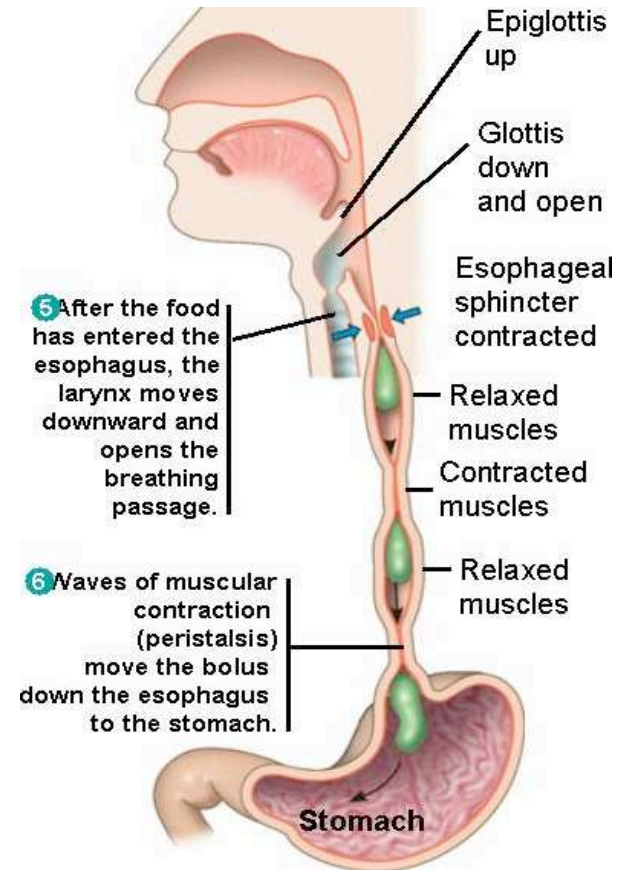


Layers continued

- Muscular – circular and longitudinal fibers squeeze and propel food
 - Serosa – outer covering, protection , secretes a serous fluid
-

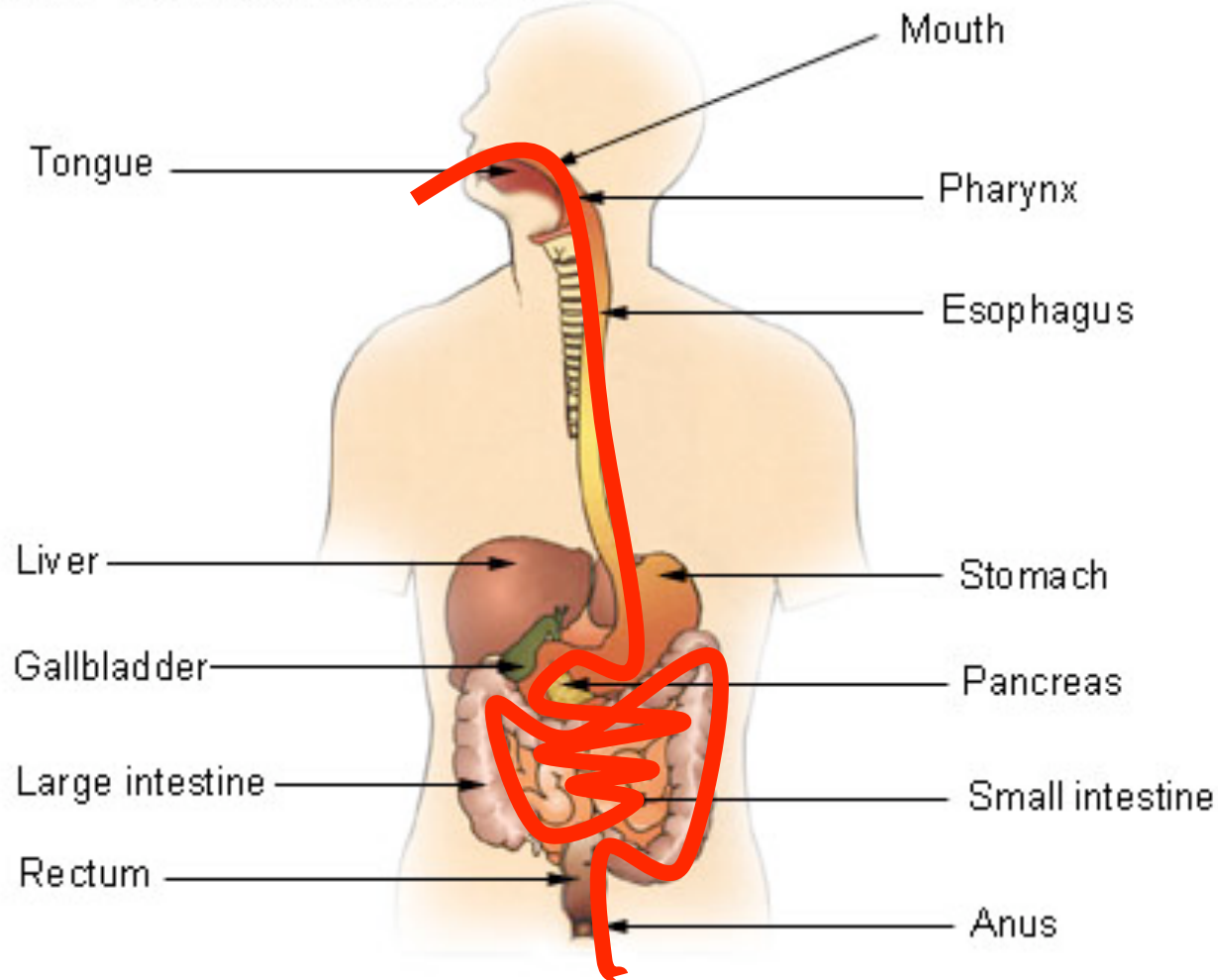
Movement of the tract

- Mixing - muscular movements contract rhythmically
- Peristalsis – wave like motion, ring contraction followed by ring relaxation

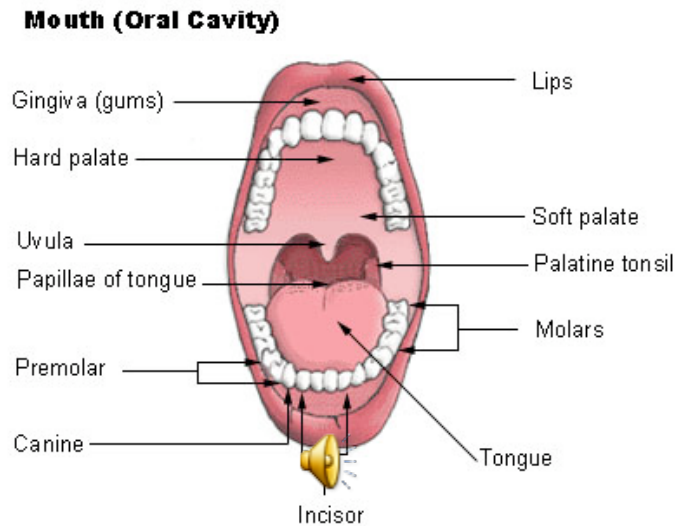


What is the path of the food we eat?

Organs of the Digestive System



Individual parts of alimentary canal



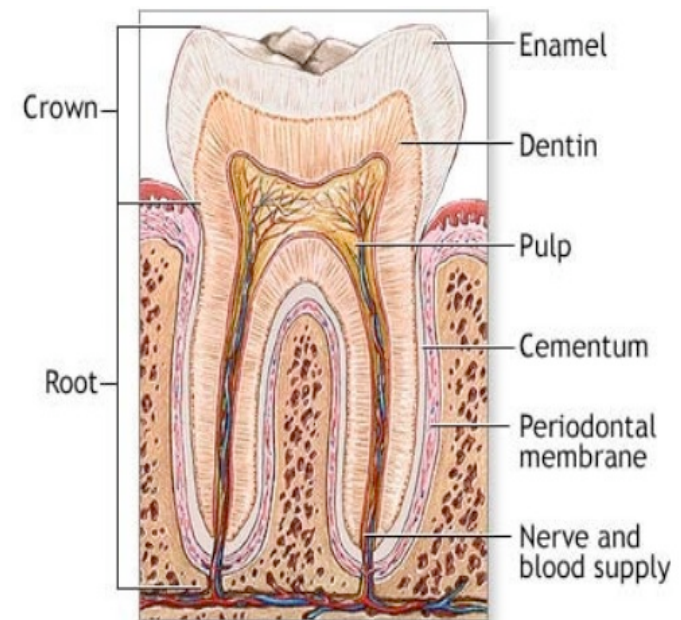
- Mouth – receives food, begins mechanical & chemical digestion
- Tongue – fills oral cavity, consists of the frenulum, body, papillae & root
- Palate – hard and soft, contains uvula



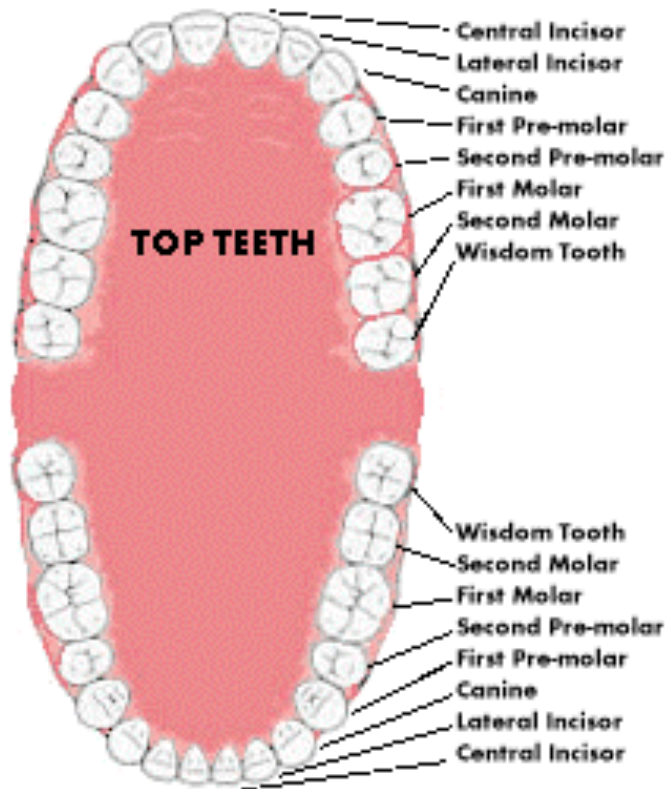
Teeth



- Primary – deciduous, 20 teeth, 6mths – 4yr.
- Secondary – permanent, 32 teeth, 6 – 25 yrs.
- Function – reduce size of food
- Parts – crown, root, neck, enamel, dentin

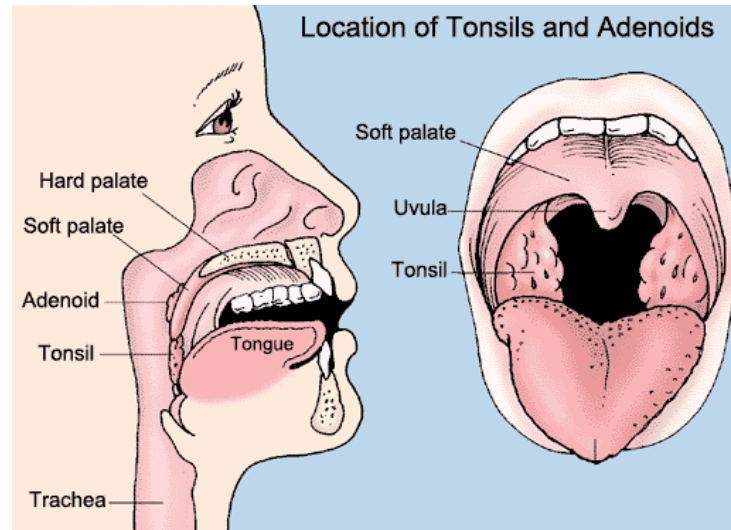


Types of teeth



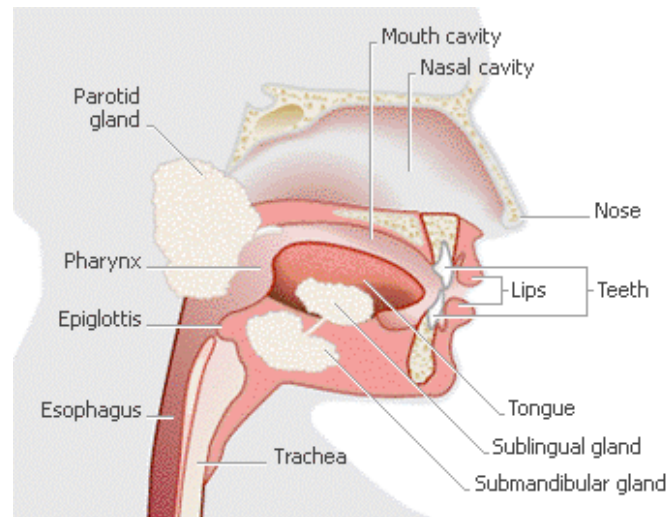
- Incisors – chisel shaped, bite off large pieces
- Cuspids – cones shaped, tear food
- Bicuspids – flattened surface, grind food
- Molars – flat, grind food

Tonsils



- Palatine – back of mouth, either side of tongue, mass of lymphatic tissue
- Pharyngeal – adenoids, posterior wall of pharynx, border of soft palate

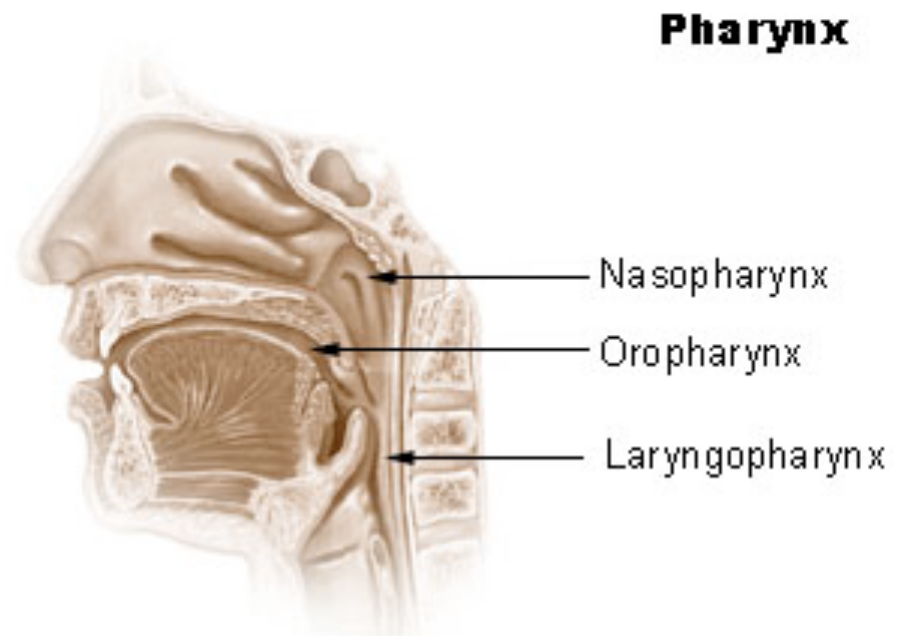
Salivary Glands



- Function: moisten and bind food, chemical digestion, keeps mouth clean, solvent so food can be tasted
- Serous(contains amylase) & mucous
- Parotid, sublingual and submandibular

Pharynx

- Function: connects the nasal and oral cavities, provides a passageway for food and air
- Three parts:
 - Nasopharynx – air
 - Oropharynx – food & air
 - Laryngopharynx – leads to esophagus

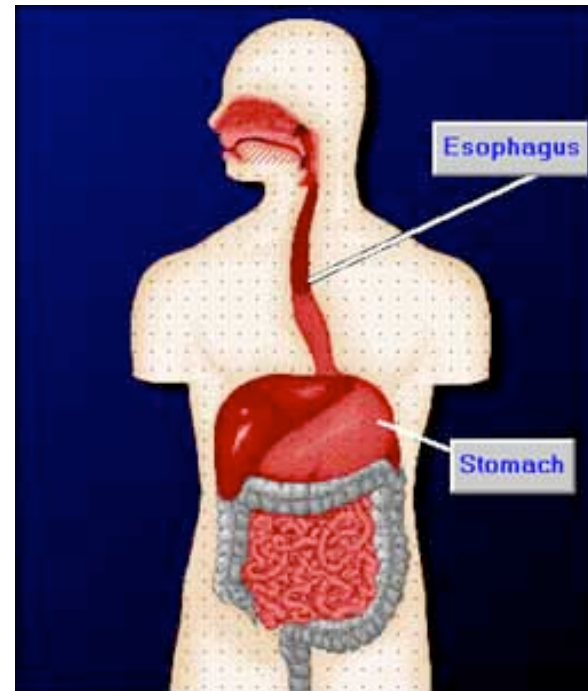


Swallowing Reflex

- http://hopkins-gi.org/multimedia/database/intro_250_Swallow.swf

Esophagus

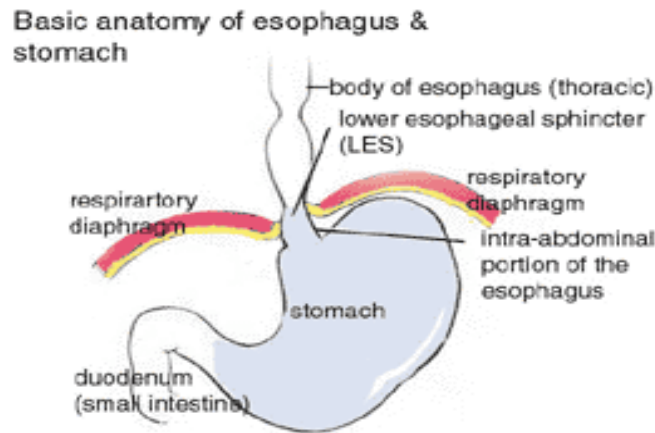
- Description: straight, collapsible tube
- Function: Food passageway from pharynx to stomach
- Health problem: hiatal hernia & esophageal hiatus – acid reflux



Hiatal Hernia Video

- <http://health.discovery.com/tools/blaussen/blaussen.html>

Sphincters (circular muscles)



- 1. Cardioesophageal – cardiac region of stomach & esophagus, prevents regurgitation, open due to peristaltic waves
- 2. Pyloric – pyloric region of stomach & small intestine, controls gastric emptying

Stomach

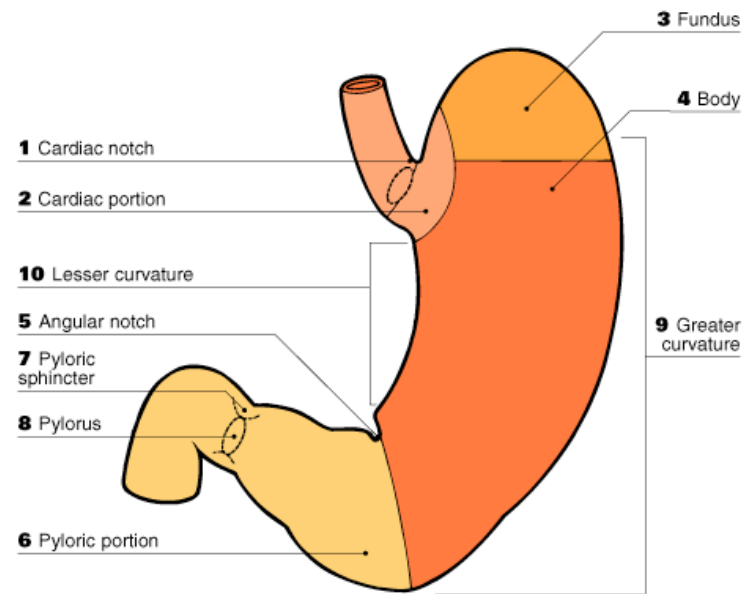
- Description: J-shaped pouch, contains rugae(thick folds),
- Function:
 - 1. receives food
 - 2. mixes food with gastric juice
 - 3. small amount of absorption(water)
 - 4. moves food to s.i.



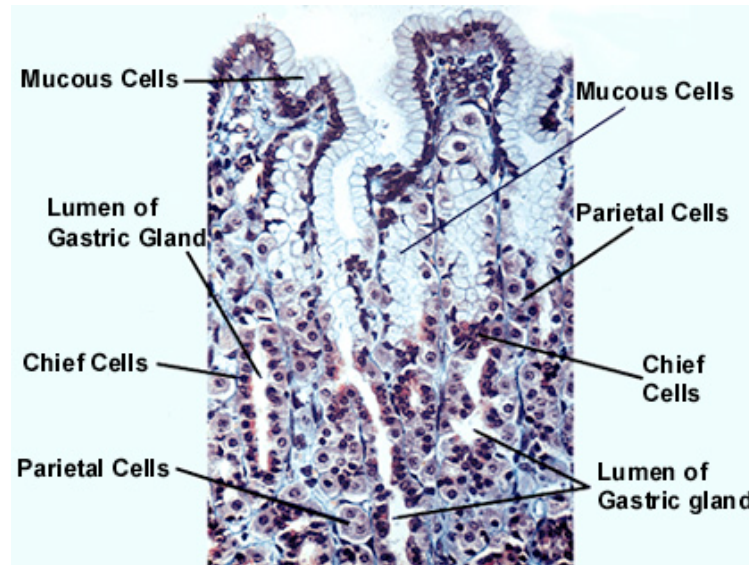
Parts of the Stomach

- 1. Cardiac – receives food from esophagus
- 2. Fundus – temporary storage area
- 3. Body – dilate/distend, mixing and mechanical breakdown of food
- 4. Pyloric – Inferior region, leads to s.i.

Schematized diagram showing parts of the stomach



Gastric Cells



- 1. Mucous(goblet cells) –mucus
- 2. Chief cells –digestive enzymes
- 3. Parietal cells – intrinsic factor(aids in vit. B absorption) & HCL

Gastric Juice

- Pepsin – protein splitting enzyme
- Pepsinogen – inactive form of pepsin
- Hydrochloric acid – provides acidic environment needed to convert pepsin –pepsinogen
- Mucus – protection



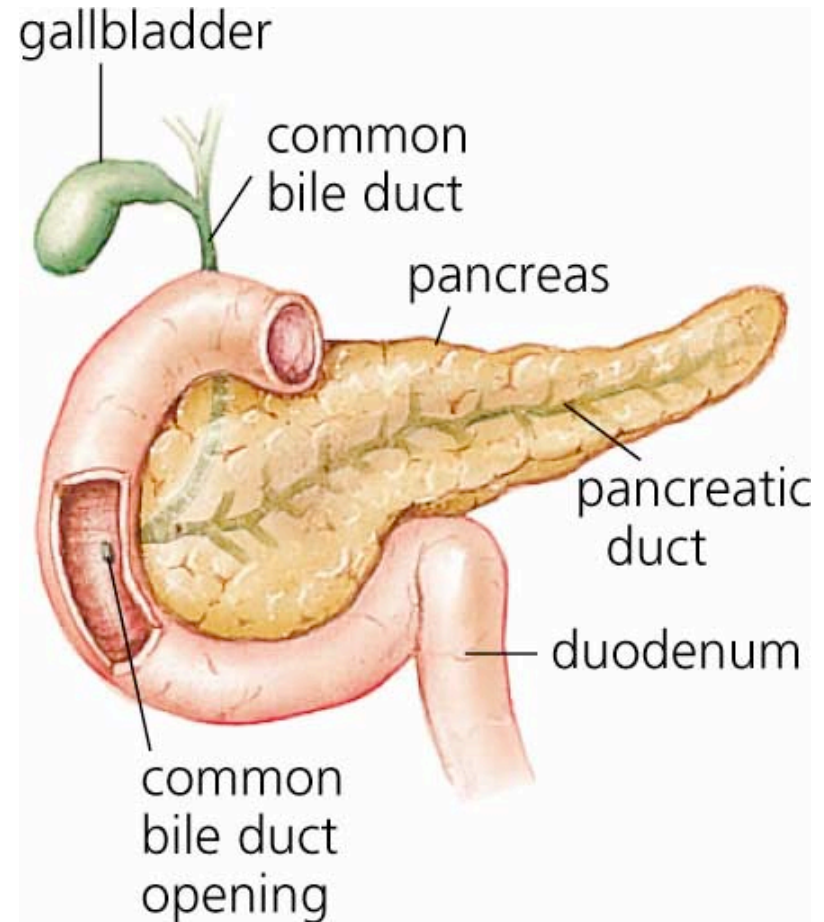
Mixing & Emptying of Stomach

- Chyme – semifluid paste of food and gastric juice moves to s.i. with peristaltic waves
- Pyloric sphincter will open due to accumulation of chyme
- Empties into the duodenum

■ http://hopkins-gi.nts.jhu.edu/pages/latin/templates/index.cfm?pg=disease1&disease=41&organ=5&lang_id=1

Pancreas

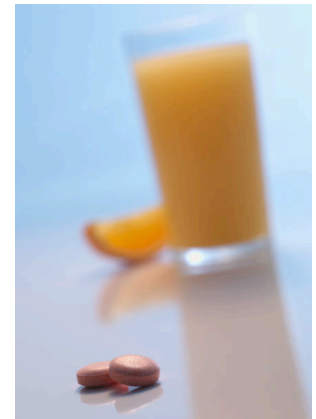
- Extends horizontally across the posterior abdominal wall, in C shaped curve of the duodenum
- Attached to the small intestine by the pancreatic duct



Carlyn Iverson

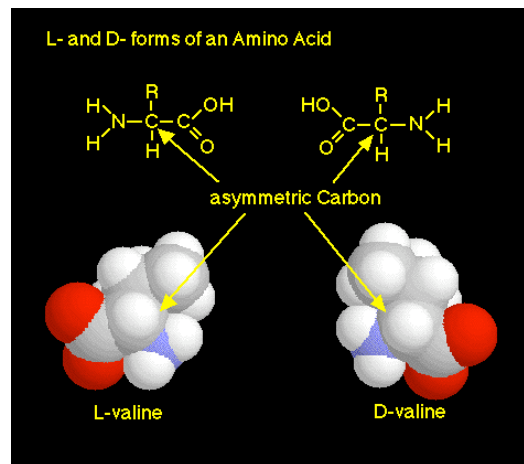
Pancreatic Juice

- Exocrine function – secretes digestive enzymes(pancreatic juice)
- Pancreatic amylase – digests carbs., splits molecules of starch
- Pancreatic lipase – digests fats, splits triglyceride molecules
- Nucleases – break nucleic acids



Pancreatic Juice Cont.

- Proteolytic enzymes - split proteins, break bonds between amino acids
 - Examples of these are trypsin, chymotrypsin & carboxypeptidase
 - Protein molecules need several enzymes to break all of the various amino acid chains

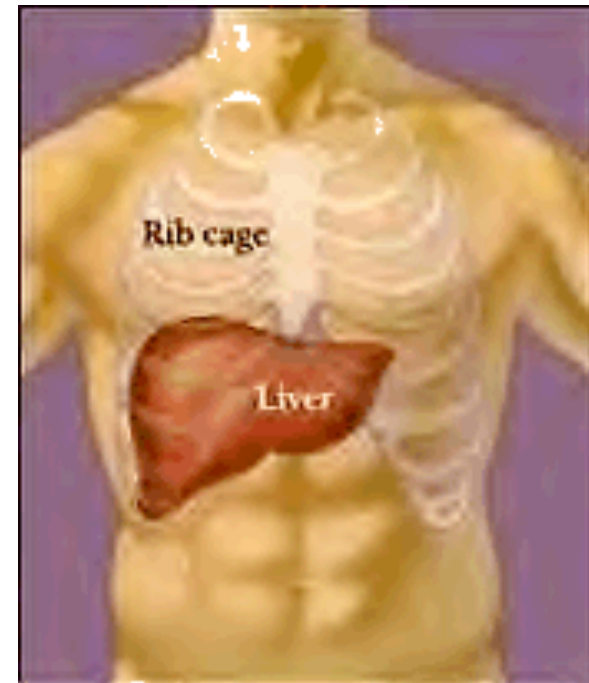


Release of Pancreatic Juice

- Regulated by the nervous & endocrine system
 - Parasympathetic impulse (portion of nervous system) stimulates pancreas to release enzymes
 - Secretin – peptide hormone released - stimulates pancreatic juice rich in bicarbonate ions which neutralize the acid of chyme
-

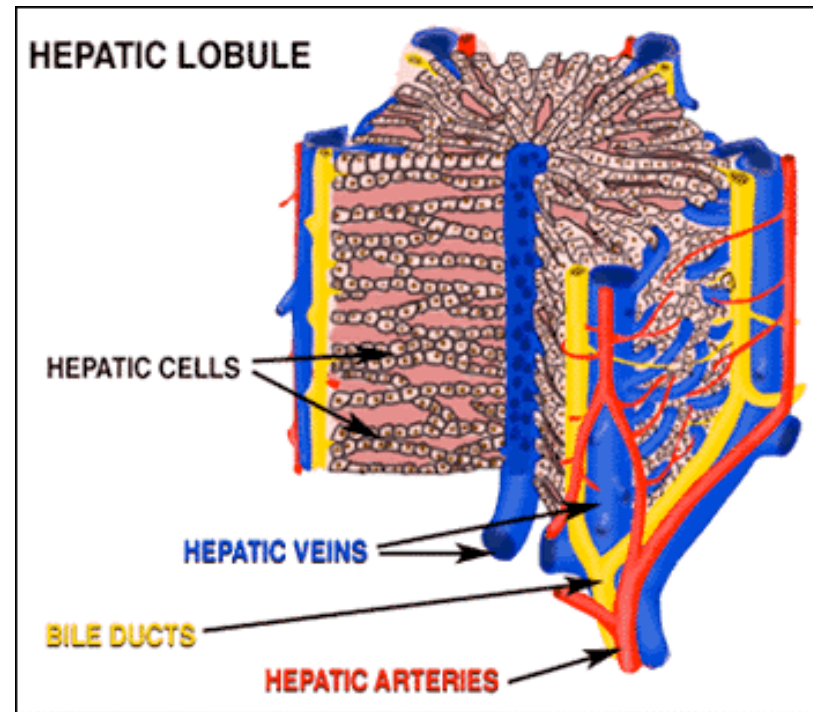
The Liver – Description

- 1. Large, multi-lobed structure
- 2. Reddish brown
- 3. Large right lobe and smaller left lobe
- 4. Contains lobules – functional unit – many hepatic cells radiating outward



Liver Description Cont.

- Hepatic sinusoids – vascular channels – separate hepatic cells
- Hepatic cells nourished by blood from digestive tract
- Kupffer cells – fixed to sinusoids – phagocytic cells



Functions of the Liver

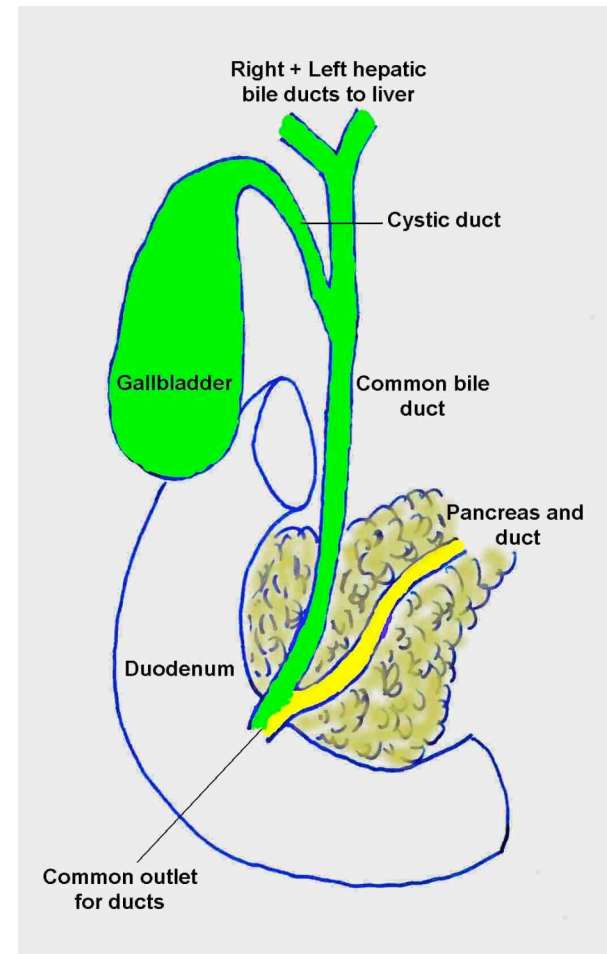
- 1. Carbohydrate metabolism – maintains normal concentration of blood glucose
 - 2. Lipid metabolism – oxidize fatty acids, synthesize lipoproteins, phospholipids and cholesterol
 - 3. Blood transports fats synthesized to adipose tissue
 - 4. Protein metabolism – deaminating amino acids, forms urea, synthesize plasma proteins
-

Functions cont.

- 5. Storage area – glycogen, iron, vitamins A, D & B12
 - 6. Clean up – removes toxic substances
 - 7. Produces bile
 - Yellowish green liquid secreted continuously
 - Contains bile salts(bilirubin, biliverdin)**
 - Cholesterol
 - Electrolytes
 - ** - only substance with digestive function
-

Gall Bladder

- Pear shaped sac , located in a depression on the liver's inferior surface
- Lined with epithelial cells, and has a strong muscular wall
- Stores bile, reabsorbs water and releases bile into s.i.



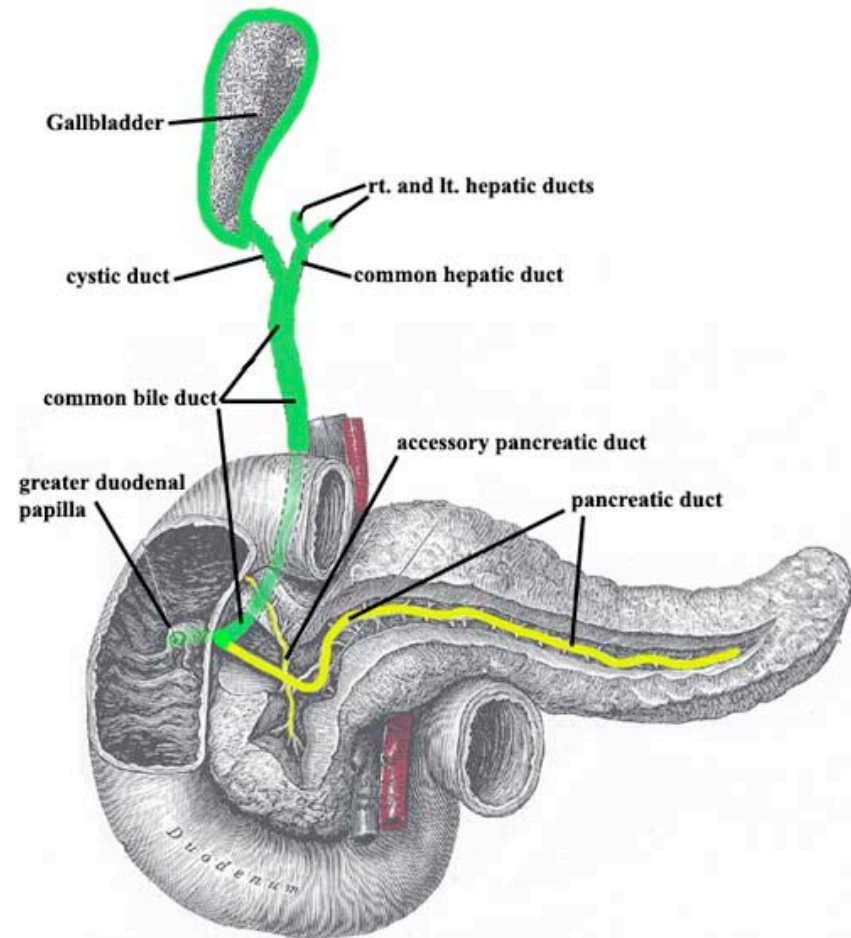
Regulation of Bile Release

Functions of Bile Salts

- Aid digestive enzymes
 - Emulsification – break fat globules into smaller droplets, this helps them mix better with water. Fat molecules will be digested more effectively
 - Enhance the absorption of fatty acids, cholesterol and fat soluble vitamins A, D, E, &K.
-

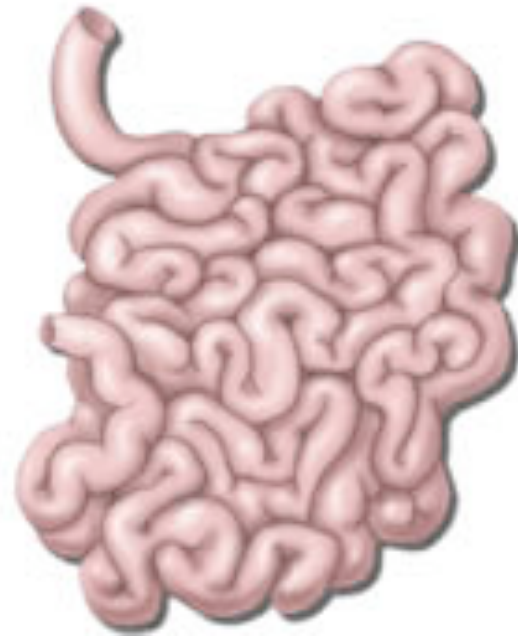
Ducts involved with Accessory Organs

- 1. Pancreatic – pancreas
- 2. Common Hepatic – one from each lobule of liver
- 3. Cystic – gall bladder
- 4. Bile– merge of hepatic& cystic



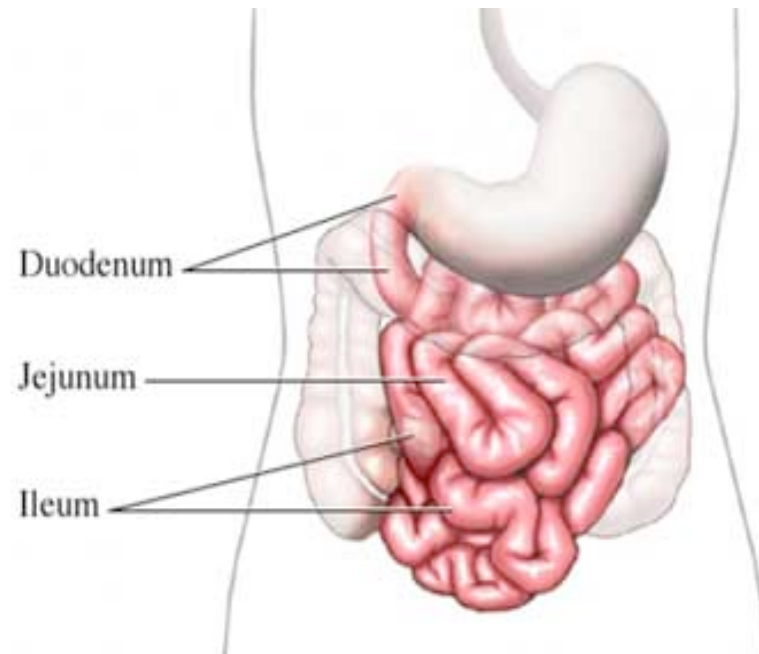
Small Intestine

- Tubular organ, many loops
- Extends from pyloric sphincter – l.i.
- Receives secretions from pancreas & liver
- Completes digestion of nutrients in chyme
- Absorbs products of digestion
- Transports residue to l.i.



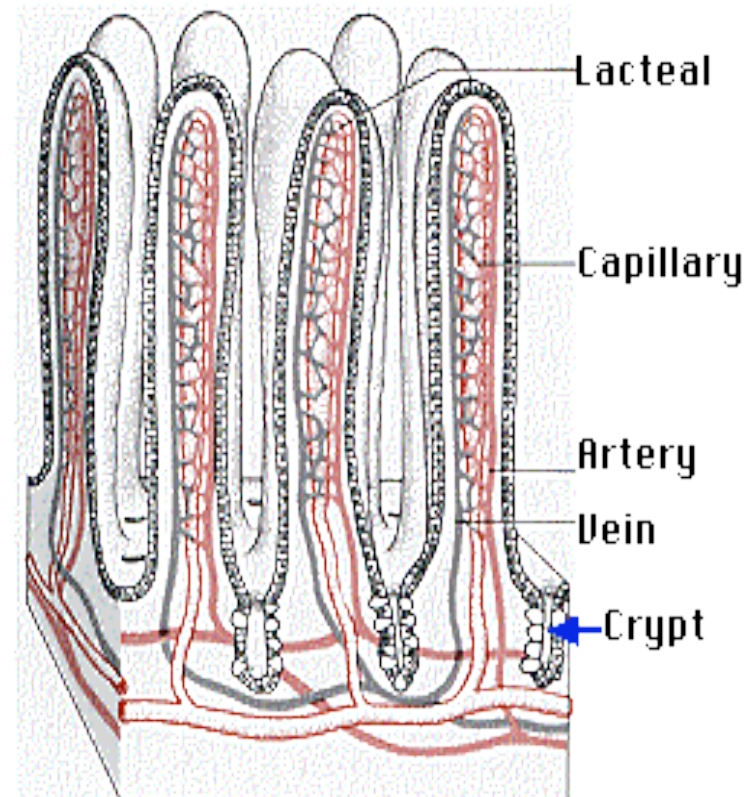
Parts of Small Intestine

- 1. Duodenum – most fixed portion, follows a C shaped path
- 2. Jejunum – mobile, more active, vascular wall
- 3. Ileum – mobile, last section
- 4. Mesentery – supports blood vessels



Wall Structure of S.I.

- Villi – tiny fingerlike projections
- Found throughout entire length
- Increase surface area
- Layer of simple columnar epithelium, core of connective tissue, nerve fibers , and a lacteal.



Secretions of S.I.

- Goblet cells of mucosa
 - Watery fluid – base of villi – provides solution to move digestive products
 - Neutral pH, lacks digestive enzymes
 - Parasympathetic nerves stimulate release of secretions , goblet cells release when chyme is present
-

Enzymes Present in S.I.

- Located in epithelial cells
 - Sucrase – sucrose
 - Maltase – maltose
 - Lactase – lactose*
 - Peptidase – peptides
 - Lipase – lipids
 - *Lactose intolerant – do not produce enough lactase
-

Absorption of S. I.

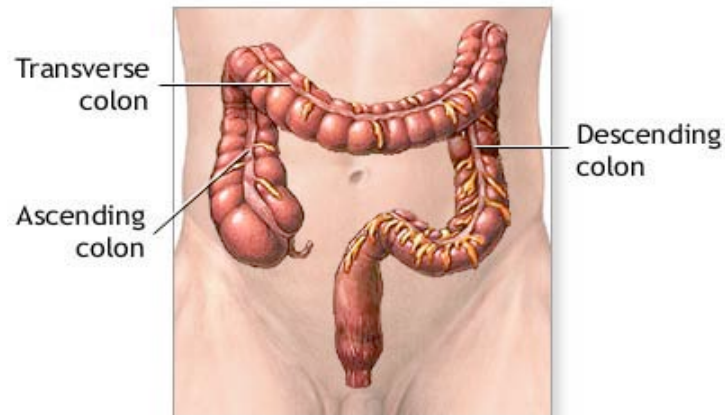
- Most important absorbing organ of digestive tract
 - Carbohydrate digestion – begins in mouth, completed in s.i.
 - Protein digestion – begins in stomach, s.i. & pancreas complete it
 - Fat digestion – begins& ends in s.i. with help from pancreas
-

Movements of S.I.

- Mixing, small ringlike contractions
 - Peristaltic waves
 - 3 – 10 hours
 - Peristaltic rush- sweeps contents into l.i. quickly(diarrhea) caused by irritation
 - Ileocecal valve – connection to l.i., after a meal this valve(sphincter) relaxes
-

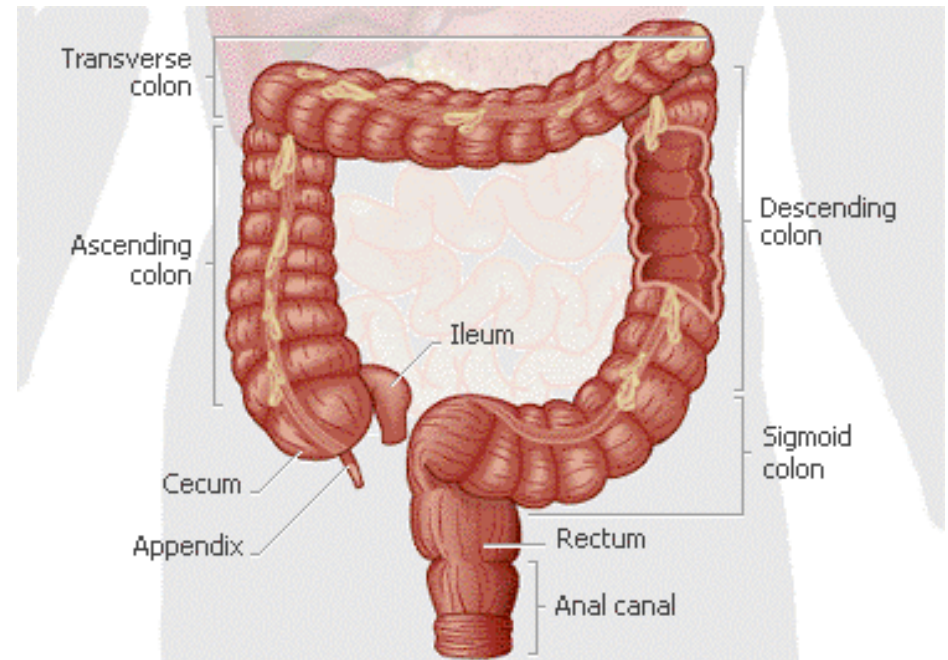
Large Intestine

- Begins in lower right side of the abdominal cavity
- Reabsorbs water, forms & stores feces
- Opens to the outside as the anus
- Ascending, transverse & descending



Parts of L.I.

- 1. Cecum – beginning, hangs below ileocecal valve
 - Vermiform appendix – no known digestive function
 - 📖 Ascending colon – begins at cecum and goes upward
 - 📖 Transverse colon – longest & most moveable part
 - 📖 Descending – downward
 - 📖 Sigmoid – S – shaped curve



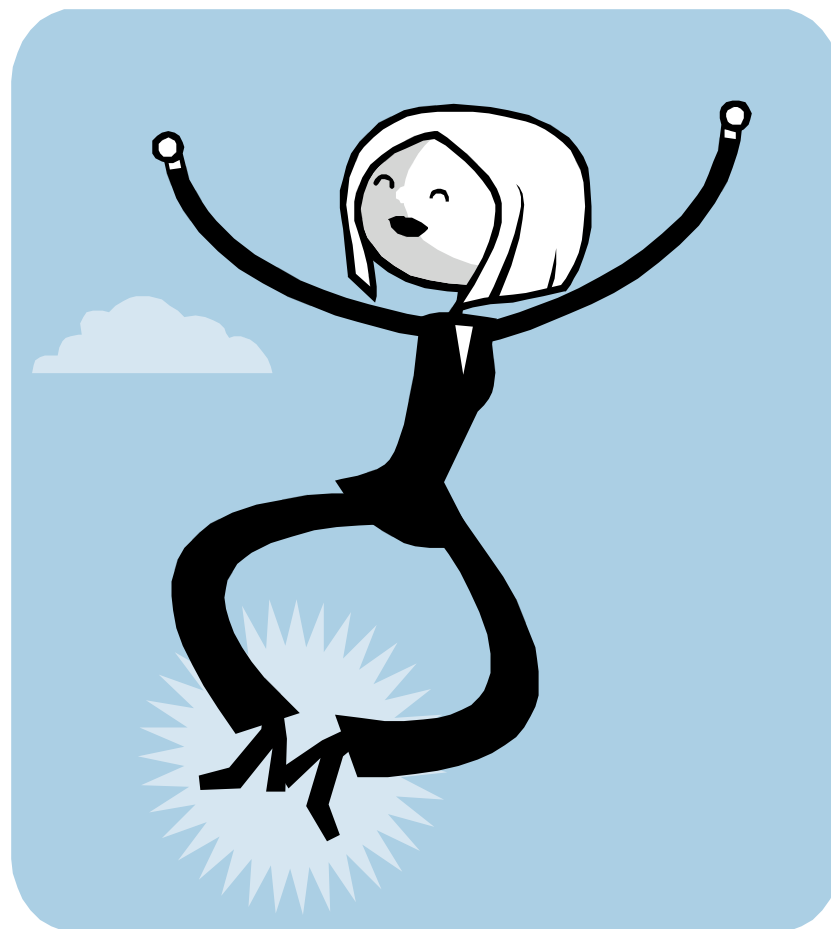
Parts cont.

- 6. Rectum – lies next to sacrum, leads to anal canal
 - 7. Anal Canal – last portion of l.i., contains anal columns(mucous membranes)
 - 8. Anus – contains 2 sphincter muscles
 - Internal – involuntary control
 - External – voluntary control
-

Structure & Function

- Lacks Villi
 - Teniae coli – bands which exert tension and form pouches
 - Haustra – pouches
 - Little to no digestive function
 - Secretes mucous(protection)
 - Absorbs water
 - Stores feces
-

Are We Having Fun Yet???



Movements of L.I.

- Mixing & peristalsis
- Slower than small intestine
- Produce mass movements
- Defecation reflex – discharge of feces



Feces

- Composed of material not digested or absorbed
 - Color is derived from bile pigment that bacterial action has altered
 - Odor - results from a variety of compounds produced by bacteria
-

That's All She Wrote!!!



Bibliography

- All diagrams taken from google images or used from our text
 - Information taken from text
-

Small Intestine
